Jet Propulsion Laboratory
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MISR Multi-angle Imaging Spectro-Radiometer

DESIGN FILE MEMORANDUM

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SUBJECT: ARP T002_0005 release
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The MSR OBC has been used to detect degradations of the cameras since launch. Before this could be done, however, the OBC had to itself be calibrated. This has been done, and documented in SDFM#231, MISR On-Board Calibrator performance, N. Chrien. This memo documents the corrections constants, k, that we believe need to be applied to the OBC photodiodes in order to make them each consistent with the HQE_blue photodiode.

$$L^{\text{std, OBC}}_{\text{measured}} = \frac{1.2395 i E_0^{\text{std}}}{(A\Omega\ )\ k} \quad (1)$$

This factor of k has been found to be variant in time, and has the values:

Table 1. OBC correction factors based upon the HQE_blue photodiode (SDFM#231)

Orbit	Notes	Band			
		BLUE	GREEN	RED	NIR
1076		1.0000	1.0405	0.9575	1.0955
1259, 1912		1.0000	1.0338	0.9571	1.0793
1314, 1912		1.0000	1.0337	0.9573	1.0782
1911 ,1912	April 27. Used for ARP 4	1.0000	1.0300	0.9561	1.0682
2575, 2585	June 11	1.0000	1.0257	0.9536	1.0531
3717, 3721		1.0000	1.0212	0.9538	1.0330

Using these coefficients, the following radiometric response coefficients were reported for the AN cameras. (These data were read from the files available in /data/ifrcc/workspace/out/ production .)

Table 2. G1 coefficients

Date	BLUE	GREEN	RED	NIR
April 27, 2000	22.5434	22.9652	30.7784	45.4112
June 11, 2000	22.3108	22.5464	29.1454	42.7529

We now wish to update this table, based upon the MISR Vicarious Calibration experiment, dated June 11th. These results have shown that:

Table 3. Ratio of MISR/ VC radiances

Parameter	BLUE	GREEN	RED	NIR
Measured (Ver 4)	0.89	0.88	0.93	0.92
Adjusted per Equation 3	0.899	0.896	0.982	0.977
Used for ARP processing	0.90		0.98	

That is, we wish to increase the radiances reported by MISR on June 11th by the inverse of these numbers. We first note that that comparison made in Table 3 was done using the MISR gain coefficients reported in ARP Version 4 (based upon April 27th data). We would have liked to have had available ARP coefficients based upon the June 11th experiment. We can make this adjustment by noting

$$L_{misr,Jun11} = L_{misr,arp4}\left(\frac{G_{1,ARP4}}{G_{1,Jun11}}\right) \quad (2)$$

therefore the actual ratio we are interested in is

$$k_{vc}' = \frac{L_{misr,Jun11}}{L_{vc}} = k_{vc}\left(\frac{G_{1,ARP4}}{G_{1,Jun11}}\right) \quad (3)$$

To a new algorithm to compute the photodiode reported radiances:

$$L^{std,\,OBC}_{measured} = \frac{1.2395 \cdot E_0^{std}}{(A\Omega)\,k_{231}}\left(\frac{G_{1,ARP4}}{G_{1,Jun11}k_{vc}}\right) \quad (4)$$

where

k_{231} are the constants given in Table 1

$G_{1,ARP4}$ are the constants given in Table 2, row 1

$G_{1,Jun11}$ are the constants given in Table 2, row 2

k_{vc} are the constants given in Table 3, row 3 = {0.90, 0.90, 0.98, 0.98}

We therefore see that we may still use the procedure developed in SDFM#231, but with a new diode constant k:

$$k_{diode} = k_{213}\left(\frac{G_{1,Jun11}k_{vc}}{G_{1,ARP4}}\right) = k_{213}k_{vc}' \quad (5)$$